IN THE CLAIMS

1. (Original) An actuator locatable in a flow path, the actuator comprising:

a single substrate upon which is fabricated a membrane and a membrane activating mechanism;

the membrane capable of moving though a first position and a second position, in the first position, the membrane inhibiting flow through the flow path, and in the second position, the membrane enabling flow through the flow path; and

the membrane activating mechanism to move the membrane between the first position and the second position.

2. (Original) The actuator of Claim 1, wherein the actuator is a non-electrostatic, non-thermal actuator.

3. (Original) The actuator of Claim 1, wherein the actuator is an electromagnetic actuator, and the substrate is provided with an orifice.

4. (Original) The actuator of Claim 1, wherein the membrane is a pre-stressed membrane, and the membrane activating mechanism includes an electromagnetic force generator;

wherein the membrane is positionable into the first position by the pre-stressed nature of the membrane;

wherein when the electromagnetic force generator generates an electromagnetic force in a first direction, the membrane is drawn into the second position; and

wherein when the electromagnetic force generator generates an electromagnetic force in a direction substantially opposite the first direction, the membrane is drawn into the first position.

5. (Original) The actuator of Claim 4, wherein the membrane is stable in both the first and the second positions without assistance of an electromagnetic force from the electromagnetic force generator.

6. (Original) The actuator of Claim 1, wherein the membrane is a convex membrane, and the membrane activating mechanism includes an electromagnetic force generator;

wherein the membrane is positionable into the first position by the convex nature of the membrane;

wherein when the electromagnetic force generator generates an electromagnetic force in a

first direction, the membrane is drawn into the second position; and

wherein when the electromagnetic force generator generates an electromagnetic force in a direction substantially opposite the first direction, the membrane is into the first position.

7. (Original) The actuator of Claim 6, wherein the membrane is stable in both the first and the second positions without assistance of an electromagnetic force from the electromagnetic force generator.

8. (Original) The actuator of Claim 1, wherein the membrane activating mechanism includes a permanent magnet, the membrane located between the electromagnetic force generator and the permanent magnet;

wherein when the electromagnetic force generator generates a force in a direction substantially in the same direction as the force of the permanent magnet, the membrane is drawn into the first position; and

wherein when the electromagnetic force generator generates a force in a direction substantially in an opposite direction as the force of the permanent magnet, the membrane is drawn into the second position.

9. (Original) The actuator of Claim 8, wherein the membrane is stable in both the first and the second positions without assistance of an electromagnetic force from the electromagnetic force generator.

10. (Original) The actuator of Claim 1, wherein the actuator has an energy consumption of 400mW or less to fully actuate.

11. (Original) The actuator of Claim 1, wherein the actuator fully actuates in less than or equal to .36 seconds.

12. (Original) An actuator locatable in a flow path, the actuator comprising:

a membrane capable of moving though a first position and a second position, in the first position, the membrane inhibiting flow through the flow path, and in the second position, the membrane enabling flow through the flow path; and

a membrane activating mechanism to move the membrane between the first position and the second position;

the membrane selected from the group consisting of a pre-stressed membrane, a convex membrane, a torsional membrane providing for rotational movement of the membrane between

the first and second positions, a membrane having a dome portion, and a membrane having a dome portion and legs.

13. (Original) The actuator of Claim 12, wherein the actuator is fabricated in a CMOS compatible process.

14. (Original) The actuator of Claim 12, wherein the actuator is an electromagnetic microvalve;

wherein the microvalve is fabricated upon a single substrate having an orifice;

wherein the membrane activating mechanism includes a magnet and at least one coil;

wherein when the at least one coil generates a force in a direction substantially in the same direction as the force of the magnet, the membrane is drawn into the first position; and

wherein when the at least one coil generates a force in a direction substantially in an opposite direction as the force of the magnet, the membrane is drawn into the second position.

15. (Original) The actuator of Claim 14, wherein the membrane is stable in both the first and the second positions without assistance of an electromagnetic force from the at least one coil.

16. (Original) The actuator of Claim 15, wherein the substrate has a first face and a second face; and

wherein the magnet is a permanent magnet in communication with the first face of the substrate.

17. (Original) The actuator of Claim 16, wherein a high permeability material with a high magnetic field saturation is provided between at least one coil turn of the at least one coil.

18. (Withdrawn) A method of fabricating an actuator on a single substrate comprising the steps of:

electroplating a high permeability material into a mould;

electroplating an electrical conductor into a mould; and

stacking the layers to make an actuator on a single substrate.

19. (Withdrawn) The method according to Claim 18, wherein the steps are conducted at temperatures of approximately 300°C or less.

20. (Withdrawn) The method according to Claim 18, wherein the actuator is an electromagnetic microvalve including a membrane and a membrane activating mechanism to move the membrane.